

V. *On an edible Fungus from Tierra del Fuego, and an allied Chilean Species.*

*By the Rev. M. J. BERKELEY, M.A., F.L.S.*

Read March 16th, 1841.

A VERY interesting account is given in 'Darwin's Researches,' p. 298, of a production which occurs very commonly in Tierra del Fuego, on *Fagus betuloides*, and forms a very important article of food to the natives. From his description, it is clear that it is referrible to the order *Fungi*, though its immediate affinities are very obscure. I was, therefore, highly gratified at having the specimens preserved by Mr. Darwin submitted to me for inspection by the kindness of Professor Henslow; and Mr. Darwin has himself been so good as to send me his original notes. I have thus been enabled to establish a new and highly curious genus, containing two well-defined species, and to ascertain with tolerable certainty its position in the mycologic system. One or two points, indeed, remain to be cleared up, but must be left to some botanist who may have an opportunity of examining these Fungi in their place of growth.

Mr. Darwin has referred me to a posthumous list of Fungi collected by Bertero, published originally in a journal, called 'Mercurio Chileno,' of which a translation by Ruschenberger is given in Silliman's 'North American Journal,' vol. xxiii. p. 78, containing a notice of a Fungus gathered in Chile, on *Fagus obliqua*, evidently congeneric with the Fuegian species. Mr. Darwin was also so fortunate as to meet with specimens which afford materials for the establishment of this second species.

Previous to detailing the characters of the genus and species, I shall beg leave to give copious extracts from Mr. Darwin's notes, which, it is to be observed, are to be regarded as loose memoranda, affording merely materials for publication, but of which the value would be much impaired by a bare analysis; and also to transcribe the greater part of the passage from Bertero's list.

“In the beech forests,” says Mr. Darwin, speaking of Tierra del Fuego, “the trees are much diseased; on the rough excrescences grow vast numbers of yellow balls. They are of the colour of the yolk of an egg, and vary in size from that of a bullet to that of a small apple; in shape they are globular, but a little produced towards the point of attachment. They grow both on the branches and stems in groups. When young they contain much fluid and are tasteless, but in their older and altered state they form a very essential article of food for the Fuegian. The boys collect them, and they are eaten uncooked with the fish. When we were in Good Success Bay in December they were then young; in this state they are externally quite smooth, turgid, and of a bright colour, with no internal cavity. The external surface was marked with white spaces, as of a membrane covering a cell. Upon keeping one in a drawer, my attention was called, after some interval, by finding it become nearly dry, the whole surface honeycombed by regular cells, with the decided smell of a Fungus, and with a slightly sweet mucous taste. In this state I have found them during January and February (1833) over the whole country. Upon dividing one, the centre is found partly hollow and filled with brown fibrous matter; this evidently merely acts as a support to the elastic semitransparent ligamentous substance which forms the base and sides of the external cells. Some of these balls remain on the trees nearly the whole year; Captain Fitzroy has seen them in June.

“Feb. 1834. Port Famine. When young, colour ‘ochre-yellow and Dutch-orange’ of the Wernerian nomenclature; smell strong; taste sweet. From the root a hollow vessel passes to the centre, from which white ligamentous rays extend through the semi-gelatinous mass to the bottom of the cells.

“June 1834. Found some\* very turgid, and highly elastic; a section of the central parts white, and the whole, under a high power, looking like a vermicelli pudding, from the number of small thread-like cylinders. At about one-twentieth of an inch from the external surface, there were placed, at regular intervals, small cup-shaped bodies, one-twelfth of an inch in diameter, of a bright ‘Dutch-orange.’ The cup was filled with adhesive, elastic, colourless, quite transparent matter; and hence at first appeared hollow. The upper

\* One of these specimens is represented at (b.), and a section of a smaller one, fig. 4.

edge of the cup was divided into conical points about ten or twelve in number, and these terminated in an irregular bunch of the above-mentioned threads; the cup was easily detached from the surrounding white substance, excepting at the fringed superior edge. Over the cup was a slight pit in the exterior surface; this afterwards becomes an external orifice to the cup, when the gelatinous mass has perhaps formed seeds."

Mr. Darwin found them much infested with larvæ, to which undoubtedly the cavity in many specimens is owing.

The following observations in Mr. Darwin's notes refer to the species noticed by Bertero:—

"Sept. 1834. On the hills near Nancagua and San Fernando there are large woods of Roble, or the Chilian oak. I found on it a yellow fungus, very closely resembling the edible ones of the beech of Tierra del Fuego. Speaking from memory, the difference consists in these being paler coloured, but the inside of the cups of a darker orange. The greatest difference is, however, in the more irregular shape, in place of being spherical: they are also much larger. Many are three times as large as the largest of my Fuegian specimens. The footstalk appears longer; this is necessary from the roughness of the bark of the trees on which they grow. In the young state there is an internal cavity. They are occasionally eaten by the poor people. I observe that these are not infested with larvæ, like those of Tierra del Fuego."

The account in Bertero's list is as follows:—

"*Fagus obliqua*, Mirb., Roble, oak, a tree common in the high mountains. In the spring is formed on the branches of this tree a great number of whitish tubercles, the parenchyma of which is spongy, though sufficiently consistent at first. I thought it a galla or excrescence, produced by the wound of some insect, as is seen on some other trees in Europe, and I gave the matter but little attention; but two days afterwards they became unglued from the branch, and I observed with surprise that the skin was broken, and the whole surface covered with pentagonal tubes precisely similar to the alveoli of a honeycomb, at first full of a gelatinous substance of the colour of milk, which disappeared with the maturation; afterwards throwing out from these cavities with some force an impalpable powder, when it was touched, exactly as is observed in the *Peziza vesiculosa*. At the end of two days these bodies softened,

lost their expulsive property, and rotted. It perhaps forms a new genus, approximating to the *Sphæriæ*. Its vulgar name is *Dignénes*. Some persons eat them, but their insipid and styptic taste is disagreeable."

#### CYTTARIA.

*Receptacula* carnosogelatinosa in stroma commune subglobosum, epidermide crassiusculâ vestitum, aggregata; basi stipitiformi granulâtâ. *Cupula* peripherica, primò clausa, gelatinâ distenta, demùm epidermide ruptâ aperta. *Hymenium*, margine excepto, separabile. *Asci* ampli, distincti, demùm liberi, paraphysibus immixtis. *Velum* persistens demùm ruptum, margine plus minus reflexo. *Sporidia* pallida.

*Genus* Bulgariæ affine, sed stromate pulvinato ex variis individuis composito Sphæriam concentricam quodammodo referente, et hymenio separabili valdè diversum. Certè ad seriem Pezizarum pertinet, perithecio spurio non obstante. Confer Sphæriam monocarpam Schum. ad Pez. rhizopodam a clar. Friesio ascriptam. Nomen dedi a κύτταρος ob superficiem fungi alveolatam.

#### Spec. 1. CYTTARIA DARWINII.

Vitellina; globoso-depressa; cupulis parvis ore irregulari demùm apertis.

*Hab.* in *Fagum betuloidem* in Tierra del Fuego. Dec.—Jun.

Small specimens, half an inch in diameter, are globose, but depressed above and below so as to resemble a little button-mushroom; strongly umbilicate below, with the edges of the umbilicus slightly puckered, and supported by a short brown stem (1½ line high, 2 lines thick), which proceeds from the umbilicus and is granulated like shagreen, as if beset with a small, black, parasitic *Sphæria*. Epidermis tough, very smooth and shining. A vertical section presents a brown fibrous mass springing from the stem, which gives off on every side elongated radiating bodies divided from each other by a dark line, but which do not separate easily from one another. The divisions of the internal mass towards the circumference are more minute but well marked, and the epidermis quite distinct. In this state there is not the slightest trace of the peripherical cups.

In a more advanced stage of growth, when the balls are from 1 to 2 inches in diameter, the cups first begin to appear, the interior presenting in other respects nearly the same appearance as before, except that the divisions are larger. They are formed beneath the cuticle, and are at first covered by a portion of the matrix. The cuticle becomes depressed, though still tough and thick. The hymenium is separable in a body from the surrounding substance, except at the top, but I have not been able to detect either

the toothed edge noticed by Mr. Darwin, or the gelatinous contents which had perhaps been dispersed by the spirit in which the specimens were preserved. The cells or cups themselves are ovate, lined almost to the top by the hymenium, which is, however, at present not perfectly developed. The substance interposed between the top of the cells and the cuticle is gradually absorbed, and the cuticle itself becomes thinner and tightly stretched over the cavity, and at length bursts and forms a membranous border to the irregular orifice. The margin appears to be a little reflected, but I could not ascertain this point accurately. The hymenium is now perfect, and consists of very slender paraphyses, and abundant, large, slightly flexuous asci, which contain eight sporidia, whose original form could not be made out, as they were contracted by the action of the alcohol. With the sporidia are a few globose granules. The asci at length become free, in which case they are generally slightly swollen at the base, and at last, in old specimens, there is scarcely any trace of them in the hymenium, which consists of the paraphyses only. When the cups are quite formed and perforated, the cellular arrangement of the contents of the balls has wholly vanished, and there are only a few faint radiating lines in place of the regular divisions. The whole substance is composed of branched, more or less flexuous threads. Occasionally the stem is not at all distinct, and the general form less globose, probably from the individuals having grown more deeply in the fissures of the bark. In the largest specimen figured there were traces of fine punctures, which had evidently arisen from the whole surface having been granulated like the stem in an early stage of growth, as some of the punctures below had still a little black granule set in them. There were besides other dots, which appear to indicate the position of undeveloped cups.

I have considered all the Fuegian specimens as belonging to one species. It is possible, however, that the larger specimens may prove distinct, though the differences, which are not apparently important, more probably arise from the period of the year at which they were gathered, as noticed above in Mr. Darwin's notes.

#### Spec. 2. *CYTTARIA BERTERÖI*.

*Pallidior irregularis, basi subelongatâ, cupulis majoribus; ore pentagono; margine fisso reflexo.*

*Hab.* in Chili in *Fagum obliquam* vere et æstate.

Paler than the last,  $1\frac{1}{2}$ —3 inches in diameter, not regularly globose, as in the last, but produced at the base. Cups large, 3-10ths of an inch or more broad; aperture more or less decidedly pentagonal, bordered by the revolute margin, which is split into portions

corresponding with the sides of the aperture. Asci more slender and longer than in the last; sporidia elliptic, smaller, separated by a granular mass. The flesh in the full-grown plant, which alone I have seen, is mottled, consisting of branched flexuous filaments. There are a few black granules about the base.

This species is clearly very distinct. I have described the asci and their contents as observed in specimens preserved in spirits. They are very different from those of *Cyttaria Darwinii*. The colour of the cuticle in the preserved specimens is brown, so that they strongly resemble potatoes. In the other species the preserved specimens are nearly colourless.

King's Cliffe, March 2, 1841.

#### EXPLANATION OF TAB. IV.

##### CYTTARIA DARWINII.

Fig. A. *Cyttaria Darwinii*, in various stages of growth.

- a. Young specimen.
- b. Large specimen, before the hymenium is perfected.
- c, c. Specimens in which the hymenium is perfected but the epidermis not yet ruptured.
- d. Elongated form, in which some of the cups are perforated.
- e. Full-grown specimen, with all the cups exposed.
1. Section of (a.) magnified.
2. Portion of the substance, highly magnified.
3. Section of stem, magnified to show the granules.
4. Section of specimen resembling (b.), in which the hymenium is scarcely perfected.
5. Section of a small specimen in which the hymenium is perfected and the cups perforated.
6. Portion of substance of ditto, from between the cups, with a fragment of the epidermis attached; highly magnified.
7. Section of one of the cups magnified, in which the hymenium is just perfected, showing that the cup is lined with it nearly throughout. The part above ( $\beta, \beta$ ) is at length confluent with the epidermis, and bursts.

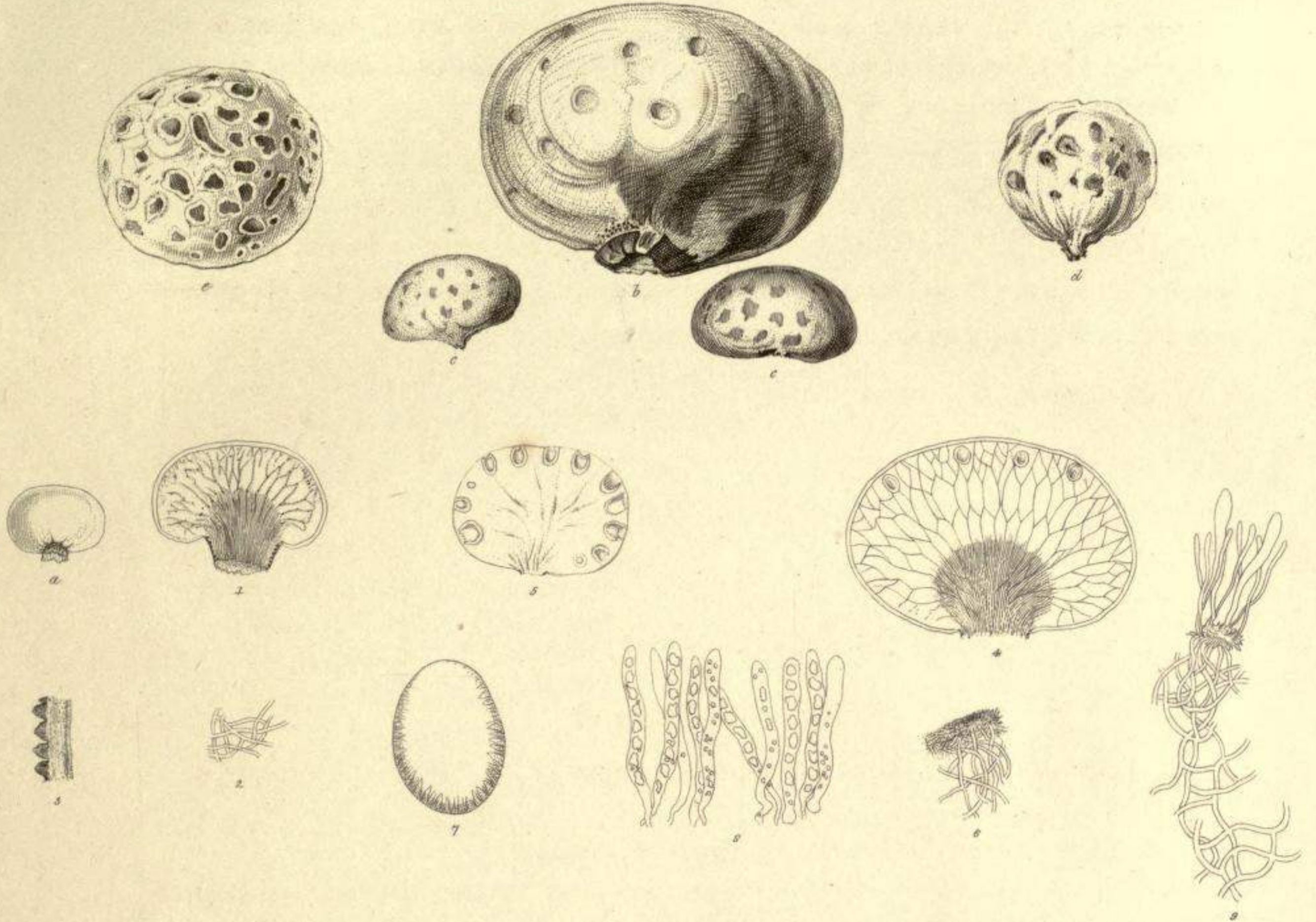
8. Asci with sporidia, highly magnified; two of the asci (*a, a*) are swollen at the base and just ready to become free.
9. Portion from an old specimen, highly magnified; showing the paraphyses and empty asci.

CYTTARIA BERTERÖI.

Fig. B. *Cyttaria Berteröi*, nat. size. One specimen, from some accident, has not attained its normal form.

- 1, 1. Sections of the two normal specimens.
2. Orifice of one of the cells, magnified.
3. Portion of the substance, highly magnified.
4. Asci and sporidia, highly magnified.

A



B

